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ABSTRACT

This paper focuses on the Vicarious Learner project, at Glasgow Caledonian University and the University of Edinburgh (Scotland) that is looking at issues concerning the role of dialogue in learning. Efforts to understand how the value of dialogue in learning depends on the structure of the environment in which it takes place are discussed. The paper begins with a description of the concept of "tertiary courseware" or "vicarious resources," i.e., courseware that contains structures to support discussion among learners and tutors and to capture these dialogues in order to make them reusable for the next group of students. Problems encountered when trying to generate such material are presented, along with some of the solutions being investigated. Also presented are tasks with which to structure and focus dialogues more effectively than generally happens in many seminar or bulletin board discussions. The use of a series of Task Directed Discussion games (TDDs) that demand increasingly deeper thinking about the domain to ease the students into discussions is highlighted. It is concluded that the TDD approach has worked for generating better discussions and hence better vicarious learning material. (Contains 14 references.) (AEF)

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The Vicarious Learner: Helping Students 'Listen In' to Learn

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Introduction

Increasingly, the role of dialogue in education is becoming a major research issue in both education and psychology. While the importance of dialogue for learning has been noted by many researchers (Hicks, 1996; Laurillard, 1993; Ohlsson, 1995; Voss, 1996), increasing class sizes and the move toward computer-based courses threatens this component with the danger of disappearing completely. We believe that the role of technology must be to push back the threshold imposed by these constraints, this being achieved by opening up new media for dialogues that are not subject to the same delivery bottlenecks as traditional methods (OECD, 1996).

The present paper describes our attempts to understand how the value of dialogue in learning depends on the structure of the environment in which it takes place. We first describe the concept of 'tertiary courseware' or 'vicarious resources'. We shall present some of the problems we encountered trying to generate such material and some of the solutions we are investigating. In particular, we present tasks with which to structure and focus dialogues more effectively than generally happens in many seminar or bulletin board discussions. Finally, we will briefly describe the system we have developed with which to deliver our courses and to research the effectiveness of tertiary courseware.

The Vicarious Learning Concept

The *Vicarious Learner* project at Glasgow Caledonian University and the University of Edinburgh is looking broadly at issues concerning the role of dialogue in learning. A specific interest, and the origin of the project name, is in the question of whether educational dialogues can be helpfully "re-used" by offering them to other learners who arrive at a problem similar to one addressed in the dialogue (McKendree et al., 1998). We believe this could be a vital element in learning—the observation of peers as learners, the *vicarious learning* experience. What benefits can students gain from dialogue as observers, not just as participants? Can these benefits be maintained for learners at a distance?

Here it is important to draw some distinctions about courseware, and to show how different kinds of support will imply different kinds of technology. "Courseware" is often interpreted to mean the content in a domain, basically like a textbook. This is what we call *primary courseware* and it encompasses many approaches—text, hypertext, multimedia, most Web material.

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Secondary courseware comprises tools which learners use to operate on this primary material, and the products of these operations. These could be presentation tools; they might be shells where students compose multimedia essays; intelligent tutoring systems; or concept mapping tools. Essentially secondary courseware supports learning activities of many kinds.

The third sort of courseware, and the main focus of this project, contains structures to support discussion among learners and tutors, and to capture these dialogues in order to make them reusable for the next group of students. We refer to this as *tertiary courseware* (Mayes, 1995). A simple example of this is Frequently Asked Questions (FAQs), but tertiary courseware may be captured from many different kinds of dialogue. Using the computer to capture this material, we are making accessible something which previously has been only a fleeting experience for the small group participants.

We have taught courses in which students learn on-line not only with expository materials and tasks that utilise what they are learning, but also with tertiary resources built from previous terms' discussions and annotated examples of work, as well as having their own discussion forum. We have also run more controlled laboratory studies to look more closely at the learning taking place when viewing these resources (Cox, et al., submitted). We have found, in general, not only positive learning outcomes but positive affective ones in terms of students' feeling that they are part of a larger community and that reading the discussions of others gives them a wider perspective (McKendree, et al., 1998).

TDDS: Tasks for Improving Student Discussions

Despite our generally positive results, it became clear early in the project that one major problem is generating good discussions in the first place (Lee, et al., 1997). Thus, a second focus of the project has been to develop methods for engaging students in effective discussions early in a course. Reasons for student silence in computer mediated discussions (as well as in face-to-face seminars) are many and varied. Some of the reasons discussed by researchers in Computer Mediated Communication for Learning (CSCL) are that students do not want to appear ignorant (van der Meij, 1988), they feel that they are talking to a 'photo-electric wall' (Sproull and Keisler, 1993), they don't know what is expected of them (Bligh, 1986), they feel that peers do not respond in the same spirit as they do (Scardemalia et al., 1992), and they find that it is too much effort and becomes a chore (Newman et al., 1995; Clark and Brennan, 1991).

Even when they do try to discuss, they often find it very difficult and often comment that they have nothing to say. But what does this mean? They have nothing to discuss because they don't know anything? They don't know how to go about discussing? They don't know what they do or don't know, so they can't discuss it? Generally, when students claim they have nothing to say, they actually mean that they have *no reason* for saying anything. Discussion naturally arises out of specific problems or tasks. Therefore, we find it essential to give students a reason to talk, to provide a goal for discussion.

To this end, we have developed a series of Task Directed Discussion games (TDDs) that demand increasingly deeper thinking about the domain to 'ease students in' to discussions (McKendree, et al., 1998). These tasks lessen the focus on trying to learn and reduce the pressure to 'sound intelligent'. All TDDs are based on the idea of eliciting discussions from students by providing them with a common focus; that is, providing a finite set of key

concepts that students must structure in various ways. These tasks are often done in pairs and involve them in trying to understand each others' interpretations.

For example, an early TDD is the 'Defining' game. One student draws a term from a pile of key concepts and tries to define it while the other student guesses what concept it is. A more complex task is the 'Repertory Grid' game in which a student selects three concepts and then must describe to a partner the ways in which two of the terms are similar, but different from the third. To date eleven task-directed discussion games have been developed.

We find that these tasks get our students discussing the course content rapidly and more deeply than the more traditional approach of posting discussion questions each week or having them formulate questions that others were supposed to reply to. We found that students not only see no point in these discussions for the reasons cited by other researchers, but often they have just not learned how to start and sustain a deep, meaningful discussion. We found them continually coming to the lecturers and saying, "We just want to know what the answer is". The TDDs get them away from this assessment-focused, 'get the right answer' attitude and into a more fruitful, sustained discussion of complex concepts quickly. The students find the tasks very motivating, we find they elicit very good exploration of the course content, and we find that the students eventually can engage in better learning discussions without relying on the TDDs, but by being able to diagnose their own understanding or lack of it.

What's more, when we use these discussions as vicarious resources, making them available as text, audio, or video clips for other students, we find that the new students become absorbed and motivated themselves. They often comment that they really wanted to jump in and contribute themselves. We are now exploring ways to use these vicarious resources to initially introduce and involve distance learners in TDDs and then to give them access to means for participating in these discussions either with other students or with the machine as a partner.

Conclusions

Our interest in generating structures for better discussions came about through our frustrations with the use of on-line discussion forums in our courses. The TDD approach has worked for generating better discussions and hence better vicarious learning material. Our courses tend to have some characteristics, however, that make them well-suited to this approach. Our courses in general are: (i) largely text based, with case studies; (ii) discursive, such that interpretations of the domain's central concepts are open to debate; (iii) synthetic, i.e. a meeting point for the concerns of many disciplines; (iv) constructive, in that abstract concepts are partially exemplified by working models and systems, some of which students will attempt to construct; and (v) learner centred, in that it invites self-reflection on one's own experiences. Such properties, we feel, make the domain ideal for the application of structured discussion tasks like task-directed discussions.

Our objective has been to provide a clearer basis for approaching the questions of how to introduce appropriate structure into learning dialogues and of the nature of the role of educational dialogue. There are still many questions to be answered involving teasing apart the tangled issues of learning task, dialogue situation, motivation and affect, before we can describe more clearly how the design of any particular tool is contributing to the overall

patterns of dialogue that result. Initially, we are creating tools to allow presentation of TDDs as types of generic structure for modulating domain information, with explicit support for the different tasks at the initial stage and a more open framework available for subsequent development of discussion, more like the current discussion environments.

More generally, we hope this will contribute to addressing the problems of how to support educational dialogue both in the classroom and in Computer Mediated Communication for Learning (CSCL) for distance learners. We hope that others will use the vicarious learning and TDD ideas to explore their application in different types of situations and different types of learning environments.

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Autobiographical Sketches

Dr Jean McKendree (presenter) received her PhD in Cognitive Psychology from Carnegie Mellon University. She worked in industrial research labs on innovative training methods and business redesign before going to University of York in 1993 to lead a nation-wide project developing software for introductory psychology. In 1995, she came to Edinburgh where she is co-principal investigator on two projects on aspects of learning from dialogue and teaching argumentation. Dr John Lee received his PhD in Philosophy from University of Edinburgh. He is a lecturer in the Department of Architecture and Director of EdCAAD, the computer-aided architectural design programme, as well as being Deputy Director of HCRC. His interests are in the processes of design and the role of external representations in reasoning and communication.

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